



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

3923-00003

Date MAY 23, 1991

AR0009

From Health Physicist
Federal Facilities Activity, OD, DHAC, ATSDR

88216509

Subject Health Consultation: Navajo-Brown Vandever and Navajo-Desiderio
Uranium Mining areas, Bluewater, New Mexico.To William Nelson, ATSDR, Region IX
Through: Director, DHAC, ATSDR *[Signature]*
Acting Chief, ERCB, DHAC, ATSDR *[Signature]*BACKGROUND AND STATEMENT OF ISSUES

On November 21, 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) released a Public Health Advisory notifying the Environmental Protection Agency (EPA) that conditions existing at several abandoned uranium mining areas in new Mexico posed a potential significant health hazard. These adverse conditions include the presence of radioactive materials, physical hazards, and heavy metals on or near residential areas where approximately 500 people reside including many children. One result of the Public Health Advisory was that EPA Region IX and the EPA Las Vegas facility collected soil, water, and air samples from the sites. These were analyzed for radioactive materials and heavy metals.

Following the collection and analysis of these samples, EPA Region IX requested the assistance of ATSDR (see attachment) to further evaluate the acute and chronic radiological hazard posed to those individuals living on or near the sites discussed in the Public Health Advisory. The EPA also requested that ATSDR assist in the estimation of the risk for those individuals living near these sites based on a two year exposure, for those individuals living near these sites.

The EPA collected soil, water, and air samples at the Brown Vandever (BV) mine area and the Desiderio (ND) mine areas. Each area was divided into sections and subdivided into stations. Using standard radiation detection equipment, a background reading for each area was measured and external environmental radiation levels were measured for each station within areas. In the BV area, the net (background subtracted) radiation levels ranged from three microroentgens per hour ($\mu R/h$) to over 750 $\mu R/h$ at waist level. On contact with the ground, the maximum level exceeded 1,225 $\mu R/h$. At the ND areas, the net radiation levels ranged from background to over 375 $\mu R/h$ at waist level and over 850 $\mu R/h$ on contact. The waist level measurements are indicative

of human exposure levels, whereas, the contact measurements suggest the emission rate of the radioactive materials.

Potable water samples were obtained from taps at both locations, a livestock well, and the nearby preschool water supply well. All amounts of detected radionuclides were below the Primary Drinking Water Standards for radioactive materials.

Soil samples collected and analyzed for both radium (Ra-226/228) and uranium isotopes (U-233/234/235/238) showed that there were high levels of these radionuclides in the soils. The maximum levels of radioisotopes detected in surface soils (top 15 centimeters) at the BV area were: for radium in excess of 260 picocuries per gram soil (pCi/g) and for uranium species more than 300 pCi/g. At the ND area, the maximum levels of radium detected in surface soils exceeded 30 pCi/g and for uranium, the maximum level exceeded 390 pCi/g.

Radon (Rn-222) flux measurements from the waste piles were also taken at several stations within the BV area. These results showed that the maximum emission rate of radon was 67 pCi per square meter per second. No measurements from the ND area were supplied to ATSDR.

The presence of physical hazards existing at these sites was also reported by the EPA, confirming earlier ATSDR concerns. The physical hazards included open mine shafts, ventilation shafts, mining pits, and unstable structures.

DOCUMENTS AND INFORMATION REVIEWED

The material reviewed for the preparation of this consultation included the ATSDR Public Health Advisory, the Code of Federal Regulations (CFR), the National Council on Radiation Protection and Measurements (NCRP) Report 91 on the Recommendations on Limits for Exposure to Ionizing Radiation, the National Academy of Sciences BEIR V report, and sampling results from the EPA dated January 29, 1991.

DISCUSSION

ATSDR reviewed these recent data and correlated the gamma radiation levels found by the EPA at the sites with the levels believed to exist at the time the Public Health Advisory was developed. These latest results verified ATSDR's concerns as expressed in the Public Health Advisory. Indeed, in some locations measured levels were twice the 500 μ R/h that ATSDR estimated could be present.

The radiation exposure levels in selected areas of these sites may represent an acute hazard to those individuals that might frequent such areas. Because of the physical nature of gamma radiation, factors such as proximity to the radioactive areas and

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the time spent in the areas, will affect the magnitude of exposure and potential health effects. For example, if an individual is 10 feet from a pile for an hour and another individual is 20 feet from the same pile for an hour, the individual 20 feet from the pile could receive a dose one fourth that of the other individual. Therefore, the more time spent closer to these waste piles or other areas with elevated radiation levels, the associated health hazards may become more of an acute than a chronic health concern. This would especially be true for local residents who frequently work or play among the piles.

According to the NCRP, the continuous or frequent annual external radiation exposure to a population should not exceed 100 millirem per year (mrem/y); the limit of 500 mrem/y should be applied for an infrequent annual exposure. If the proposed limit of 100 mrem/y for the public is used for these sites, the annual radiation exposure limit at the Navajo sites in question would easily be exceeded during a year.

Using the above criteria, the radiation exposure rates near the subject residential areas would be considered as representative of a chronic, low level radiation exposure. There are also data to suggest that an imminent radiological health hazard exists to individuals who might frequent the waste piles. In the Public Health Advisory, ATSDR defined an imminent radiation health hazard based on 10 CFR 20.104-105. The levels measured at the waste piles at these sites could exceed these requirements. Additional support for classifying these sites as an imminent public health threat can be found in 40 CFR 190.10 which states that the annual radiation exposure to the entire body should not exceed 25 mrem per year. The 40 CFR 190.10 exposure limit includes releases of radioactive materials, except radon and its decay products, from all phases of operations using uranium, including mining and milling operations. Because some piles have emission rates of approximately one Mr/h, which is nearly equivalent to one mrem/h, the 40 CFR 190.10 maximum allowable annual exposure limit could be reached after several short periods of exposure.

During the visits ATSDR has made to these particular sites, uranium ore bearing materials were observed both next to residential areas and in structural components of the residences. Because ATSDR did not receive any sampling data or monitoring data concerning Rn-222 levels in residential areas, the extent of any exposure from the radon cannot adequately be determined. Such data would be required to complete the evaluation of the public health hazards.

EPA Region IX also requested that ATSDR determine if the risk of exposure exceeded the 1×10^{-4} risk level as described in the National Contingency Plan for removal action or remedial action

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assessment for the purposes of remediation and clean-up, it is the purview of the EPA, not ATSDR, to address risk management issues; therefore, ATSDR cannot respond directly to this request. However, ATSDR refers the EPA Region IX to the ATSDR Health Advisory and the discussion of the BEIR V report that discusses the risk of excess cancer mortality for males and females exposed to ionizing radiation at a rate of 100 milliroentgens per year (mR/y). These risks are for a lifetime exposure of 70 years.

The Navajo people do not tend to be a migratory population but have a tendency to remain close to their ancestral lands and homes. Thus, long-term exposure to varying levels of radiation as present at these locations must be considered, not the two year exposure as discussed in the EPA letter of January 29, 1991. The exposures to these levels of ionizing radiation have been occurring for much longer than the two years it would take for a remedial removal action to take place.

CONCLUSIONS

Based on the available data and interpretation of existing Federal Guidelines and recommendations of the NCRP, ATSDR concludes that:

1. Radiation exposure at these sites could result in adverse health effects depending on the amount of time spent in radioactively contaminated areas. The soils in residential areas appear to be relatively safe; whereas, if much time is spent in areas containing the waste piles, an imminent health problem could result;
2. The soil sampling data indicated that the levels of radium-226 in the top 15 cm of soils exceed the regulatory limits (40 CFR 192);
3. The data indicate that radon-222 (Rn-222) emission rates from the abandoned waste piles exceed the guidelines of 20 pCi per square meter per second (40 CFR 192);
4. The physical hazards at the site still pose a public health concern and have not been addressed with regards to site safety both for residents and potential workers at these sites.

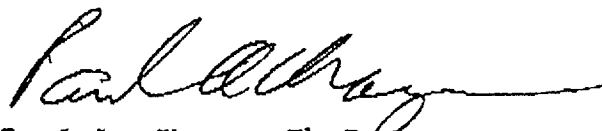
RECOMMENDATIONS

Because of the nature of gamma radiation, simple but effective measures can be implemented to reduce the health hazards. Since the levels of radiation detected are a public health hazard and the physical hazards are still present at these sites, ATSDR is making the following recommendations to protect the public health at the Brown Vandever and Desiderio mining areas.

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making the following recommendations to protect the public health at the Brown Vandever and Desiderio mining areas.

1. Although the sampling procedures sufficiently determined the levels of radioactive materials in the areas of the mine wastes, ATSDR feels that additional air samples for Rn-222 need to be collected in the residential areas. The Rn-222 data should be collected, analyzed, and submitted to ATSDR as quickly as time permits.
2. Because of the physical nature of the contaminants at these sites, it would be prudent to restrict site access by an appropriate and approved method.
3. An additional site safety plan for residents should be in place to address the radioactive and physical hazards at this site besides the site safety plan in place for on-site workers.
4. The recommendations of ATSDR as listed in the Public Health Advisory are still applicable to this site including the possibility of exposure studies of local residents.



Paul A. Charp, Ph.D.

Attachment

cc: Dr. M. Lichtveld

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ATSDR:DHAC:ERCB:TSS:FF:PCharp:mrg:4/22/91:0615



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street
San Francisco, Ca. 94105

January 29, 1991

MEMORANDUM

SUBJECT: Bluewater Uranium Mine Preliminary Assessment Data

FROM: *Donald C. White*
Donald C. White, Chief
Field Operations BranchTO: Bill Nelson, Regional Coordinator
ATSDR

Enclosed are the radionuclide and gamma survey data collected by the Emergency Response Section (ERS) preliminary assessment, conducted on November 15-16, 1990, at the Brown-Vandever and Desiderio Uranium Mine Sites, located outside of Prewitt, Navajo Nation, New Mexico. This assessment was performed at the request of the Agency for Toxic Substances and Disease Registry (ATSDR) to identify if the Sites pose any immediate adverse environmental and health hazards.

Site Background

The Navajo-Brown Vandever (N-BV) and Navajo-Desiderio (N-D) mine sites are located within the Ambrosia Lake subdistrict of the Grants Uranium Mining District. The N-BV mine site encompasses approximately 155 acres, and the N-D covers 130 acres. The sites lie within a sparsely populated agricultural area.

Several families live on both mine sites. Approximately thirty people live on the N-BV site, including children, and approximately forty people live on the N-D site. The land is primarily utilized as grazing areas for the cattle, horses, sheep and goats.

Both mine sites consist of strip mine pits, tailing piles and open vent and mine shafts. There are presently no barriers prohibiting access to these mined areas.

As you are aware, ATSDR issued a Health Advisory for the sites on November 21, 1990. Since then, ERS has been consulting with Greg Demspey and Colleen Petullo, Office of Air and Radiation, Las Vegas and yourself.

Data

Figure 1 shows the locations of the mine sites. Figure 2 shows the Brown-Vandever Mine Site and Figure 3 shows the Desiderio Mine Site. Table 1 contains the gamma survey data. Table 2 lists the radionuclide data obtained from the water and soil samples. Figure 4 divides the Brown-Vandever Mine Site into four sections which were surveyed and sampled. Figures 5-8 show the sampling locations within each section of the Brown-Vandever Mine Site. Figure 9 shows the sampling locations from the Desiderio Mine Site. Appendix A contains the results of the Radon Flux experiment conducted at the Desiderio Mine Site. Appendix B contains the heavy metal sample results. Appendix C contains the laboratory data sheets.

ATSDR Assistance

We are requesting ATSDR assistance in interpreting the radionuclide assessment data for the purpose of determining if an imminent and substantial health risk exists at either of the sites. For instance, the data reveals that nearly all of the sampling points within the mined areas appear to exceed the promulgated standard for Radium-226, which should not exceed 5 pCi/g above background within the first fifteen centimeters of soil, as outlined in 40 CFR Section 192.12. We need help in determining if the sites pose an acute (need to do a removal action) or a chronic (remedial action more appropriate) health risk. One criterion that could be used to determine if a removal action is warranted is an increased carcinogenic health risk of 1 in 10,000 or more after a two year exposure. This criterion is based on the following:

- A) A risk of 1 in 10,000 is the high end of the risk range established by EPA in the NCP which requires a response action;
- B) It is estimated that it would take over two years for the EPA remedial program to be able to address these sites since neither has yet to be placed on the NPL.

It is important to select a number of criteria that can be used on more than one site since there are many similar sites in Arizona and New Mexico. Our decision is likely to set a precedent for future potential removal actions at these type of uranium mine tailing sites. In addition, you (ATSDR) must determine what steps need to be undertaken in response to your Health Advisory based on what EPA will do at these sites.

I look forward to your quick response to this issue. If you have any questions concerning the data, please contact Robert Bornstein, On-Scene-Coordinator, at 415-744-2298 (FTS 484-2298).